Space Weather Forecast

Issued on Thursday 10 October 2024 at 13:13 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: CME inbound: Moderate G2 geomagnetic storm expected, slight chance severe G4 in next 24 hours. Further Major solar radiation storm (S3) Likely. Now reducing risk of further Major (R3) radio blackouts.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been at High levels, with a Strong-class X-ray flare peaking at 09/1547UTC and a pair of Moderate class flares at 09/2312UTC and 10/1159UTC - all from a region now departing the southwestern solar horizon.

There are seven sunspot regions on the facing side of the Sun at present, although this number is likely to be in a state of flux due to emerging regions, eastern arrivals and western solar horizon departures. The recent most active group is now presenting as its trailing spots only in the far southwest, and it will shortly cross to the far side.

In the east, a rapidly-growing new sunspot region emerged, with a spreading tendency taking over as the period evolved. In the northeast, a small magnetically unipolar group developed. An active region near the middle of the Sun showed consolidation and areal decay throughout its constituent spots.

A Coronal Mass Ejection (CME) was seen leaving the Sun in association with the Strong-class flare from the far southwestern sunspot in the period. This has been modelled as passing significantly ahead of the Earth and plays no part in the forecast. A second CME visible heading apparently northeast into the current UTC day has been determined to be far-sided, again to no effect at Earth. No new Earth-bound CMEs were therefore in evidence.

Solar Wind / Geomagnetic Activity: The solar wind showed a decline towards a slow regime in the wake of recent CME and perhaps also minor fast wind influence.

The solar wind speed showed a slow decline within slightly elevated levels. The number of particles in the solar wind was within background levels, as was the associated magnetic field. The north-south component varied about zero, not spending any protracted length of time anti-aligned with Earth's field (which would otherwise be to greater geomagnetic effect).

The net result of the above solar wind measures was for provisionally mostly quiet geomagnetic activity.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Energetic Particles / Solar Radiation: Solar radiation levels continued their response to the Strong-class flare from 09 October. 10MeV protons peaked at 1115pfu (S3, major solar radiation storm) at 10/0325UTC and are showing a very gradual downward trend. 100MeV commenced their downward tendency prior to this reporting period, and peaked at 0.8pfu at the start of the 24-hour window (where an alert is issued for 100MeV levels above 1pfu).

Four-Day Space Weather Forecast Summary

Solar Activity: The chances of further Strong-class flares and Major radio blackouts (R3) reduce in the period as the most active sunspot region leaves the facing side. Minor radio blackouts (R1) remain likely given sunspot developments on the Sun; their complexity; and up to four arrivals over the eastern solar horizon to round out the current UTC working week.

Solar Wind / Geomagnetic Activity: There is now one CME in the forecast: the Strong-class flare and 'filament eruption'-related event early on 09 October. This is due into the current UTC evening - G2 Moderate geomagnetic storm is expected and there is a slight chance of activity as high as G4 Severe geomagnetic storm into Friday 11 October. The effects should then wane to quiet over the UTC weekend, with a late slight chance of Minor geomagnetic storm G1 should a fast wind materialise from a minor following coronal hole.

Energetic Particles / Solar Radiation: Solar radiartion levels are likely to briefly return to S3 Major solar radiation storm under the influence of the inbound CME, gradually waning from here to leave a slight chance of S3 by the UTC weekend and a chance of Minor S1 levels by the end of the four days - still slightly above the residual risk for the Sun.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	No	95	95	60	5
Strong	**G3**	No	40	50	10	1
Severe	**G4**	No	10	20	1	1
Extreme	**G5**	No	1	5	1	1

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	75	65	60	60
Very Active	R3-R5 (X Class)	Yes	25	15	10	10

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	Yes	100	95	60	30
Very Active	≥ S3 *	Yes	70	60	20	5
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.